

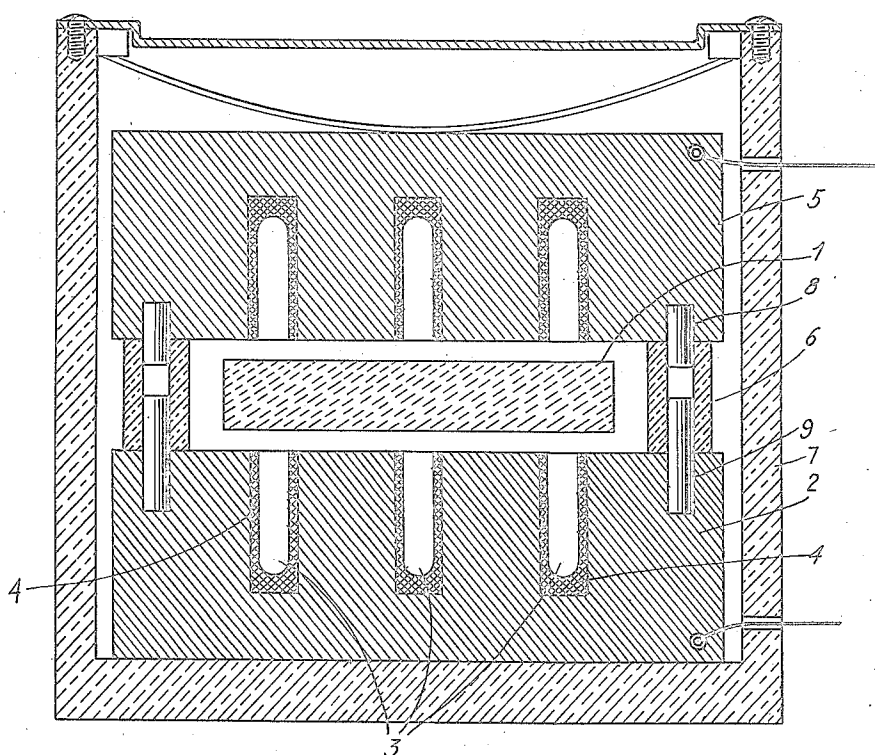
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PIEZO-ELECTRIC CRYSTAL HOLDER

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PIEZO-ELECTRIC CRYSTAL HOLDER

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4 Claims. (Cl. 171—327)

This invention relates to a mechanically oscillating resonator or oscillator, especially of piezo-electric nature.

An object of this invention is to simplify and improve the present piezo-electric crystal holders.

In mechanically oscillating resonators or oscillators, especially in quartz crystal oscillators adapted to the generation of high-frequency oscillations, disturbances have been noticed in certain arrangements, to be more precise, when the electrode surfaces and holder walls which wholly or partly surround the oscillator, were located at a distance from the oscillator and being of an order of magnitude of the wavelengths in the gas between the oscillating body electrodes and the wall. What happens is that standing waves are set up in the gas. This trouble becomes particularly serious whenever the distance between the wall and the oscillator is such that the space is in a state of resonance with the wave so that the oscillations get a chance to build up into a large amplitude by virtue of such state of resonance. Now, according to this invention the said troublesome action is suppressed by the use of an electrode surface shaped in a special form and of material which will produce a damping effect upon waves set up inside the gas.

A wall or electrode according to this invention may consist, for instance, of a smooth plate in which, as known in the art having depressions, grooves cut therein, the nature of the grooves and the spacing apart of the grooves are so chosen that the intended damping of the waves inside the gas will be obtained. Especially by making the said depressions or grooves with sharp edges the arising of eddies will be promoted in the gas, and these will tend to produce a damping effect upon waves in the gas. A particularly simple form of construction of the wall is obtained by making the same of metallic gauze which, if desired, may be cemented or soldered upon a flat support. The wall could also consist of a kind of material which, owing to its acoustic properties, for example, its porosity, produces a wave-damping or deadening effect.

The arrangement as hereinbefore disclosed finds a particularly useful application in connection with piezo-electric or quartz-crystal oscillators where the distance between the electrode and the quartz crystal varies under normal working conditions. It is known to those skilled in the art that the frequency of the crystal can be altered; for example, by variable electrode distance which, for instance, can be controlled by the aid of bimetal strips and thus made a function of the temperature and subjected to automatic regulation and adjustment, it is feasible

to render the frequency of the crystal independent of the temperature.

The single figure of the drawing is a vertical sectional view of one embodiment of my invention.

One exemplified embodiment of the basic idea of this invention which is preferably used is shown in the drawing. Referring to the same, 1 denotes, for instance, a quartz crystal oscillator, 2 is the lower electrode which is provided with grooves 3. 5 is a similar upper electrode, 6 indicates insulating member for spacing the electrodes 3 and 5. 7 shows a simple casing for retaining the electrode and crystal. The grooves 3 are filled during manufacture with a liquid which by chemical or physical working contracts into a granular and porous layer 4. The said liquid could consist, for instance, of an agglutinant mixed with chalk or a similar granular substance. By simple drying, provided the agglutinant has been chosen of suitable concentration, the desired effect can be obtained. Also in chemical respect, for instance, by filling the grooves with an aqueous saccharine solution followed by heating thereof up to the carbonizing point of the sugar, it is possible to produce a sound-deadening coat, i. e., the filling up of the grooves with porous charcoal. It may be desirable to polish the surface of the electrode after application of the surface, and to free the grooves from impurities by the use of air or a sand-blast.

I claim:

1. A piezo-electric crystal holder, comprising a casing, a crystal within said casing, and a plurality of electrodes each having a plurality of grooves in the surface facing said crystal, a coating of acoustic deadening material lining the grooves of said electrodes.

2. A piezo-electric crystal holder, comprising a casing, a crystal within said casing, a plurality of electrodes each having a plurality of grooves in the surface facing said crystal, a coating of acoustic deadening material lining the grooves of said electrodes, and means within said casing to maintain spring pressure on said electrodes.

3. A piezo-electric crystal holder, comprising a casing, a crystal within said casing, and a plurality of electrodes each having a plurality of grooves in the surface facing said crystal, a coating of a binder mixed with chalk lining the grooves of said electrodes.

4. A piezo-electric crystal holder, comprising a casing, a crystal within said casing, and a plurality of electrodes each having a plurality of grooves in the surface facing said crystal, a coating of a liquid solution which is later carbonized by heating lining the grooves of said electrodes.

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